

June 22, 2005

Mr. Karl W. Singer
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: REQUESTS FOR ADDITIONAL INFORMATION (RAIs) FOR THE REVIEW OF
THE BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3, LICENSE
RENEWAL APPLICATION (TAC NOS. MC1704, MC1705 AND MC1706)

Dear Mr. Singer:

By letter dated December 31, 2003, Tennessee Valley Authority, (TVA or the applicant) submitted an application pursuant to 10 CFR Part 54, to renew the operating licenses for Browns Ferry Nuclear (BFN) Plant, Units 1, 2, and 3, for review by the U.S. Nuclear Regulatory Commission (NRC). The NRC staff is reviewing the information contained in the license renewal application (LRA) and has identified, in the enclosure, areas where additional information is needed to complete the review.

These RAIs were discussed with your staff, Ken Brune, and a mutually agreeable date for this response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-1478 or e-mail RXS2@nrc.gov.

Sincerely,

/RA/

Ram Subbaratnam, Project Manager
License Renewal Section A
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos.: 50-259, 50-260, and 50-296

Enclosure: As stated

cc w/encl: See next page

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Adams Accession No.: ML051730507

Document Name: E:\Filenet\ML051730507.wpd

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BROWNS FERRY NUCLEAR PLANT

Tennessee Valley Authority

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BROWNS FERRY NUCLEAR PLANT

-2-

Tennessee Valley Authority

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DISTRIBUTION: Letter to K. Singer, Re: RAI for review of Browns Ferry Nuclear Plant, Units 1 and 2, Dated: June 22, 2005

Adams Accession No.: ML051730507

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**BROWNS FERRY NUCLEAR PLANT (BFN) , UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA)
REQUESTS FOR ADDITIONAL INFORMATION (RAIs)
FOLLOW UP QUESTIONS TO SECTION 4.7.7 TIME LIMITED AGING ANALYSIS RAIs**

Section 4.7.7 of the LRA evaluated loss of preload of the core plate hold-down bolts due to thermal and irradiation effects in accordance with the requirements of 10 CFR 54.21(c)(1)(ii). For the 40-year lifetime, the Boiling Water Reactor Vessel and Internals Project-25 (BWRVIP-25), concluded that all core plate hold-down bolts will maintain some preload throughout the life of the plant. For the period of extended operation, the expected loss of preload was assumed to be 20%, which bounds the original BWRVIP analysis. With a loss of 20% in preload, the core plate will maintain sufficient preload to prevent sliding under both normal and accident conditions. Based on this assumption, the applicant concludes that the loss of preload is acceptable for the period of extended operation. The NRC staff previously sent RAIs 4.7.7-1 and 4.7.7-2 by letter dated March 3, 2005. The following are follow up questions.

RAI 4.7.7-3

(a) In response to RAI-4.7.7-2(b), the applicant referenced stress relaxation curves that were developed by General Electric Nuclear Energy (GENE). Provide the data that was used to develop the curves and explain how this data was utilized to establish the curves.

(b) The applicant's response referenced a paper by J.P. Foster, "Analysis of In-reactor Stress Relaxation Using Irradiation Creep Models," which provides data regarding the relationship between the irradiation creep stress/strain vs. displacements per atom (dpa) by using a "McVetty" equation. Did General Electric Company (GE) use this equation to calculate the maximum stress relaxation curve for the type 304 stainless steel bolts at the end-of-life fluence (54 EFPY) for the BFN Units?

RAI 4.7.7-4

To justify the GENE analysis, the applicant referenced Figure 7-13 of the BWRVIP-99 report, "Crack Growth Rates in Irradiated Stainless Steels in BWR Internal Components," which shows data and modeling projections for stress relaxation versus fluence values measured in displacements per atom (dpa), for 20% cold worked type 316 stainless steel material. Provide an explanation as to why the type 316 stainless steel data is applicable to the type 304 stainless steel core plate hold-down bolts at the BFN units.

RAI 4.7.7-5

The paper by J.P. Foster uses a "Half-Nelson" model to calculate displacement damage (measured as dpa) due to radiation. Provide the dpa values for type 304 core plate hold-down bolts that correspond to end-of-life fluence (54 EFPY) using the "Half-Nelson" model or its equivalent for the BFN units.

RAI 4.7.7-6

Provide justification for the application of relaxation curves obtained in torsion to axial relaxation in bolts.

RAI 4.7.7-7

BWRVIP-25, Appendix B refers to a letter dated January 15, 1997, from V. L. McCarthy to B. A. McAllister, GENE, "Core Plate Bolt Relaxation Calculations for Extended Period of Operation."

Enclosure

The staff requests that the applicant provide these calculations so that it can evaluate the stress relaxation of the core plate hold-down bolts for the end-of-life fluence (54 EFPY) for the BFN units. The applicant may like to make appropriate proprietary determination as necessary to make original vendor evaluation available for staff review.